NASA TECH BRIEF

Single-Source Mechanical Loading System Produces Biaxial Stresses in Cylinders

The problem:

To design a simplified machine for proportioning axial-to-hoop tension loads applied to cylindrical specimens. Conventional machines depend on electrical devices and dual manual controls to produce biaxial loading ratios.

The solution:

A machine employing a single-source mechanical loading system consisting of hydraulic, pneumatic, and lever arrangements.

How it's done:

To prepare a cylinder for testing, the ends are sealed with special closures (as in the conventional systems) and fitted with attachments for applying the external axial loads and internal hoop pressures. The cylinder is then installed in the loading machine, and the external and internal pressures are applied simultaneously in a fixed ratio by a single high pressure gas source.

The system is adaptable for testing at room temperature and cryogenic temperatures. High pressure nitrogen is used as a gas source for room temperature tests and high pressure helium for the tests at liquid nitrogen and liquid hydrogen temperatures. Prior to pressurization, the test cylinders are filled with water for the room temperature tests and liquid nitrogen or liquid hydrogen for the cryogenic temperature tests.

Note:

Inquiries concerning this system may be directed to:

Technology Utilization Officer
Marshall Space Flight Center
Huntsville, Alabama 35812
Reference: B67-10380

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

Source: R. L. Stafford and J. F. Flower
of Douglas Aircraft Company
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